Volunteer Lake Assessment Program Individual Lake Reports

GREAT POND, KINGSTON, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	5,376	**Max. Depth (m):**	16.2	**Flushing Rate (yr^{1})**	2.4
Surface Area (Ac.):	204	**Mean Depth (m):**	3.8	**P Retention Coef:**	0.56
Shore Length (m):	6,600	**Volume (m^{3}):**	4,172,000	**Elevation (ft):**	118

TROPHIC CLASSIFICATION

Year	Trophic class
2004	MESOTROPHIC
2009	EUTROPHIC

KNOWN EXOTIC SPECIES

The Waterbody Report Card tables are generated from the DRAFT 2014 305(b) report on the status of N.H. waters, and are based on data collected from 2004-2013. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm

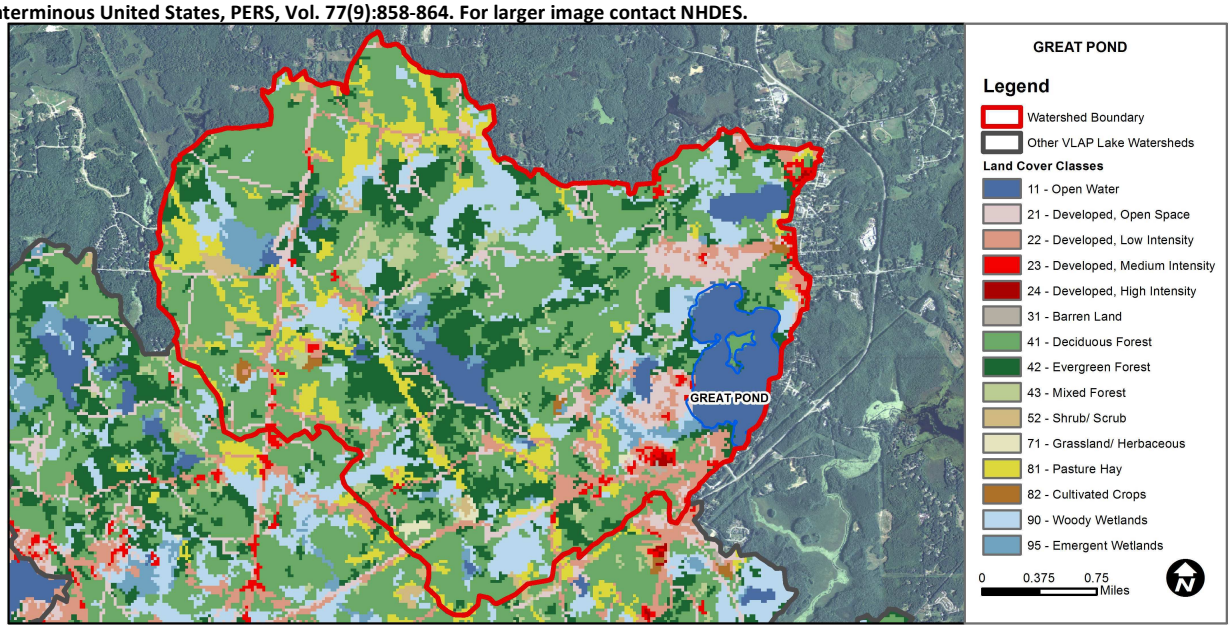
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator and the chlorophyll a indicator is okay.
	pH	Bad	>10%, with a minimum of 2, samples exceed criteria, with 1 or more by a large margin.
	Oxygen, Dissolved	Very Good	There are a total of at least 10 samples with 0 exceedances of criteria.
	Dissolved oxygen satura	Slightly Bad	There are >10% of samples (minimum of 2), exceeding criteria.
	Chlorophyll-a	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator.
Primary Contact Recreation	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.
	Cyanobacteria hepatoto	Slightly Bad	Cyanobacteria bloom(s).
	Chlorophyll-a	Very Good	There are a total of at least 10 samples with 0 exceedances of indicator.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

GREAT POND - CAMP BLUE TRIANGLE BEACH	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.
GREAT POND- GREAT POND PARK ASSOCIATION BEACH	Escherichia coli	Bad	There are >=1 exceedance(s) of the geometric mean and/or >=2 single sample criterion exceedances. One or more exceedance is >2X criteria.
GREAT POND - KINGSTON STATE PARK BEACH	Escherichia coli	Slightly Bad	There are >=1 exceedance(s) of the geometric mean and/or >=2 single sample criterion exceedances. Exceedances are <2X criteria.
GREAT POND - KINGSTON STATE PARK BEACH	Cyanobacteria	Slightly Bad	Cyanobacteria bloom(s).

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.



Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	7.03	Barren Land	0.05	Grassland/Herbaceous	0.27
Developed-Open Space	6.22	Deciduous Forest	37.79	Pasture Hay	7.4
Developed-Low Intensity	5.99	Evergreen Forest	16.25	Cultivated Crops	0.32
Developed-Medium Intensity	1.05	Mixed Forest	2.19	Woody Wetlands	11.86
Developed-High Intensity	0.1	Shrub-Scrub	1.11	Emergent Wetlands	2.36

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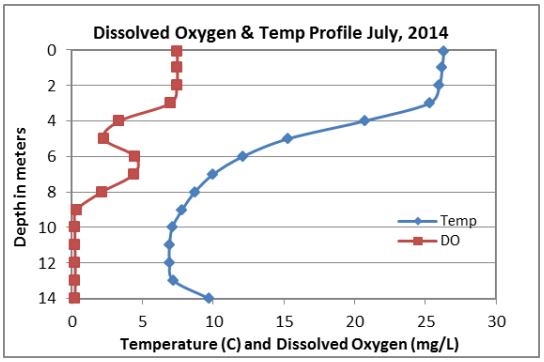
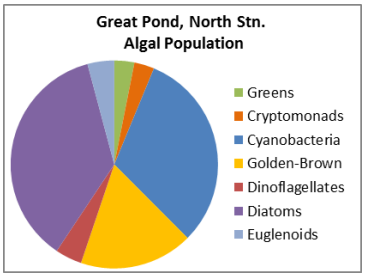
Great Pond, North Stn., Kingston

2014 Data Summary

Observations and Recommendations (*Refer to Table 1 and Historical Deep Spot Data Graphics)*

- **Chlorophyll-a:** Chlorophyll levels were relatively stable from June through August and were less than the state median. Historical trend analysis indicates stable chlorophyll levels since monitoring began.
- **Conductivity/Chloride:** Deep spot and Thayer Rd. Inlet conductivity and chloride levels were elevated and much greater than the state medians. Historical trend analysis indicates significantly increasing (worsening) epilimnetic (upper water layer) phosphorus levels since monitoring began. Ball Rd. Inlet conductivity and chloride were average and only slightly greater than the state medians.
- **Total Phosphorus:** Epilimnetic phosphorus levels decreased from June to July and then increased slightly from July to August. A significant storm event of 2.0—3.0 inches of rainfall occurred prior to the July sampling event and may have flushed nutrients out of the pond leading to the lower epilimnetic phosphorus measured in July. Historical trend analysis indicates stable epilimnetic phosphorus since monitoring began. Metalimnetic (middle water layer) phosphorus decreased slightly from June to August, and hypolimnetic (lower water layer) phosphorus remained stable from June to July and increased greatly in August likely due to the release of phosphorus from bottom sediments during anoxic conditions; a process called internal phosphorus loading. Ball Rd. Inlet and Thayer Inlet phosphorus levels were elevated on each sampling event likely due to wetland influences and low tributary flows.
- **Transparency:** Transparency decreased slightly from June to August, however the 2014 average transparency improved from 2013 and was the best measured since 1999! Transparency measured with the viewscope (VS) was almost 1.0 meter better than without and may be a more accurate measure of transparency. Historical trend analysis indicates relatively stable transparency with moderate variability between years.
- **Turbidity:** Epilimnetic and metalimnetic turbidity were relatively low and stable from June through August. Hypolimnetic turbidity was elevated on each sampling event indicating the accumulation of organic compounds in hypolimnetic waters under anoxic conditions. Ball Rd. Inlet turbidity was elevated in August due to organic material in the sample. Thayer Rd. Inlet turbidity was elevated and increased steadily from June through August potentially due to highly colored water from wetland influences and low flow conditions.
- **pH:** Epilimnetic pH was sufficient to support aquatic life and within the desirable range of 6.5—8.0 units. Historical trend analysis indicates highly variable epilimnetic pH since monitoring began. Metalimnetic, hypolimnetic, Ball and Thayer Rd. Inlet pH levels are less than the desirable 6.5 units and potentially critical to aquatic life.
- **Recommended Actions:** The worsening conductivity trend highlights the importance of educating local residents, road agents and winter maintenance companies on following best practices for winter de-icing procedures. Encourage them to obtain a Voluntary NH Salt Applicator license through UNH Technology Transfer Center's Green SnowPro Certification. The decreased epilimnetic phosphorus in July following a significant storm event is a great sign as stormwater runoff typically causes an increase in phosphorus levels. Continue educating watershed residents on ways to reduce stormwater runoff from their properties utilizing DES' "Homeowner's Guide to Stormwater Management". Keep up the great work!





NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: > 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: between 6.5-8.0 (unless naturally occurring)

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.
Alkalinity: 4.9 mg/L
Chlorophyll-a: 4.58 mg/m^3
Conductivity: 40.0 uS/cm
Chloride: 4 mg/L
Total Phosphorus: 12 ug/L
Transparency: 3.2 m
pH: 6.6

Station Name	Table 1. 2014 Average Water Quality Data for GREAT POND, NORTH STN.								
	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Cond. uS/cm	Total P ug/l	Trans. m		Turb. ntu	pH
						NVS	VS		
Epilimnion	13.9	3.67	41	192.4	10	3.50	4.42	1.20	7.03
Metalimnion				183.4	12			1.36	6.58
Hypolimnion				188.3	39			18.25	6.33
Ball Rd Inlet			10	59.3	86			4.24	5.89
Thayer Rd Inlet			44	212.2	67			5.00	6.48

Historical Water Quality Trend Analysis

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Worsening	Data significantly increasing.	Chlorophyll-a	Stable	Trend not significant; data show low variability.
pH (epilimnion)	Stable	Trend not significant; data highly variable.	Transparency	Stable	Trend not significant; data moderately variable.
			Phosphorus (epilimnion)	Stable	Trend not significant; data show low variability.